

# CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

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BERTRAM P. BROWN, M.D., Director

## Weekly Bulletin



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GUY P. JONES  
EDITOR

## Naturalistic Methods In Mosquito Abatement

(Continued from last issue)

In some agricultural operations where considerable water is required, mosquito breeding can be controlled by intermittent drying at sufficiently short intervals between floodings. This would appear to be a possible control measure in rice growing. It was by law made compulsory in Portugal in 1938, but in California the idea has not received any welcome. It involves the construction of adequate drainage systems to effectively remove the water, and such systems may entail a considerable expense.

Some species of mosquitoes, especially of the *Aedes* genus (whose eggs are laid on ground which will eventually be covered by flood water, tide water or artificially applied water) can be prevented from breeding by maintaining water constantly on the land at a uniform and unchanging surface elevation. This method we term "constant level flooding." It can be used effectively to prevent the breeding of *Aedes* mosquitoes on duck club properties, especially if the water added to make up for evaporation and seepage losses is introduced in such a manner as to give circulation, and if the impounded area is stocked with larvicidal fish.

But just the opposite procedure can be used to reduce the breeding of an entirely different mosquito, *Anopheles quadrimaculatus*, the malaria transmitter in our southern states. This species is typically a pond and impounded water breeder, and it generally rests quietly at the water surface among organic

floatage, which helps to conceal and protect it from the attention of natural enemies such as surface feeding fish. For the control of this species of mosquito, lowering the water level tends to strand floatage on shore and so minimize the protection, as well as stranding and killing many larvae; subsequent raising of the water level increases shore depths and gives fish a better access to the remaining larvae. Such caused variations have been adopted as recommended procedures by some of the State Boards of Health in our southern states, and are carried out by hydroelectric plants and other industries which impound water, as a means of reducing the cost of supplemental abatement measures such as the application of paris green from airplanes or boats.

Another naturalistic method which is likewise practically a management of mosquito breeding water is what is termed "controlled reflooding and redraining." In the case of many species of *Aedes* mosquitoes, which lay their eggs on ground which will eventually be covered with water, we have found that not all eggs will hatch on any one wetting, but many will remain and require a number of successive wettings before hatching. Obviously, then, if we could hatch out all the eggs on a marsh, by successive wettings, without permitting the deposition of any new eggs, in time we should be able to clean a marsh of all hatchable eggs. Actually, we have been able to do that with considerable success. The plan is the

result of various observations and suggestions by the late N. M. Stover, W. B. Herms and myself, but it has been most extensively applied by Fred W. Rush of the Solano County Mosquito Abatement District. By from seven to ten cycles of flooding and then rapidly draining off the water into the bay before the larvae could emerge as adult mosquitoes, Rush has practically eliminated *Aedes dorsalis* breeding on extensive areas of marsh on the north side of Suisun Bay.

Another method which is also a management of breeding water is the flushing of stream beds and drains, usually by automatic means. LePrince used such flushing in Panama, as did Sir Ronald Ross at Ismalia. It has been used extensively against stream breeding malaria transmitters such as *Anopheles maculatus* in Malaya, and recently against *Anopheles minimus flavirostris* in the Philippine Islands.

For the abatement of *Anopheles culicifacies*, which breeds usually in stream bed pools, and is the principal malaria vector in Ceylon, Macdonald has developed an inexpensive automatic siphon which is pre-cast in sections at a central concreting plant, and assembled where required. With a small dam to accumulate water, considerable lengths of stream bed or drain bottom can be kept free from mosquito breeding by the intermittent flushing caused by this device.

Another naturalistic control method depends upon the preference of certain species of mosquitoes for either sunlight or shade on their breeding water. In Malaya, for example, *Anopheles maculatus*, the malaria transmitter in the hill areas, is a sunlight-lover, and does not breed appreciably in shaded streams, whereas *Anopheles umbrosus*, the principal transmitter of malaria in the lowlands, prefers heavily shaded water. Therefore in the lowlands the clearing of swamp vegetation and shade tends to reduce malaria prevalence, but in the hill areas the encouragement of shade along streams is of material help in preventing malaria.

Other kinds of "naturalistic" methods of mosquito control could be cited, together with numerous examples of methods which are essentially naturalistic in conception and execution. The cases cited are sufficient, however, to indicate that careful studies of the habits of a particular mosquito species may indicate relatively simple methods by which slight but sufficient changes in environment may be brought about so that breeding conditions are wholly or relatively unsuitable to the development of this particular species. In some cases this may be done at a small cost as compared with the usual methods of drainage and oiling; in others it may greatly reduce the cost of larvicidal methods such as oiling; or such a method

may substitute successfully for drainage where such a primary method is inapplicable on account of excessive cost or other difficulties.

Successful naturalistic methods of mosquito abatement are not evolved overnight by some lucky guess or feat of imagination. Their development requires patient and often prolonged investigation of a mosquito species in relation to its environment, and they are usually the product of intense study by men trained along biological and especially ecological lines, or by professional men who have developed a marked biological and ecological cast in their thinking. There is no reason why both health officials and mosquito abatement people cannot train themselves to think along these lines. The result will be more effective control of both disease-vector and pest mosquitoes, and our health officers should familiarize themselves with the principles of these naturalistic methods, even though they need not be specialists in the details of their application.

#### OBNOXIOUS ODORS FROM OIL REFINERIES

Complaints by San Francisco residents of offensive odors attributed to gases emanating from oil refineries in the East Bay area were investigated recently at the request of the San Francisco City Health Department. Inspections of refineries and other industrial establishments in Alameda and Contra Costa counties revealed that these companies are taking every possible precaution to prevent the escape of poisonous and malodorous gases and fumes from processes in which these substances are generated or evolved as by-products. No cases of illness which might be due to such atmospheric contaminants were found among employees of the plants or among residents in the vicinity of the plants. Highly sensitive test papers, posted at locations where the complaints originated, showed that poisonous gases which might emanate from industrial establishments were not reaching these points in demonstrable quantities.

Under certain atmospheric and weather conditions, disagreeable-smelling gases and fumes from plants in the East Bay region are evidently carried across the Bay in sufficient quantities to be perceptible by the sense of smell, thus creating an odor nuisance to San Francisco residents; but there is no evidence to indicate that such gases travel more than a few hundred feet from their source in concentrations sufficiently great to be detrimental to health.

The pleasantest things in the world are pleasant thoughts; and the great art of life is to have as many of them as possible.—Montaigne.

### CONJUNCTIVITIS IN FISH CANNERIES

During the latter part of November and the first week in December, a serious health problem arose at Terminal Island in Los Angeles Harbor, as a result of an epidemic of conjunctivitis among employees in fish canneries in this area, which lies within the Los Angeles city limits. About 25 per cent of the 3500 workers in the canneries developed eye inflammation of such severity as to incapacitate them for work for periods ranging from one to five days for each attack. Sardine cutters comprise the great majority of affected workers. Investigations by the State Industrial Hygiene Service, in cooperation with the Los Angeles City Health Department, included physical examinations of employees, interviews with plant officials and industrial physicians, inspections of operations and processes in the canneries, atmospheric tests at working locations, and chemical analyses of water from the sardine cutting tanks, harbor water, sludge from the harbor floor. These studies showed that the outbreak of conjunctivitis was due to the exposure of employees to hydrogen sulfide gas, which is highly irritating to the mucous membranes of the eyes and upper respiratory tract. This gas was being liberated into the atmosphere from contaminated water, which is pumped from the harbor to flume the fish from the weighing tanks to the cutting tanks. The source of dissolved hydrogen sulfide in the harbor water was traced to the decomposition of an accumulated layer of fish scales, slime, scraps, and other organic refuse, rich in sulfur content, on the harbor floor. Quantitative atmospheric tests at the breathing level of workers over the sardine cutting tanks showed the presence of concentrations of hydrogen sulfide in excess of the toxic threshold or maximum safe limit for this gas.

Sporadic cases of conjunctivitis have occurred among cannery workers in this area in previous years, but this type of disability has not heretofore reached epidemic proportions. Several factors have operated simultaneously to aggravate the hazard this year, including an unusually heavy catch of fish, requiring larger volumes of fluming water to be pumped into the plants; overloading of the cannery waste sewage disposal system, with backing up of industrial sewage into the plants and streets, and its overflow directly into the harbor, increasing pollution of the harbor water; and stagnation of water in the harbor due to a period of unusually calm weather, the absence of the scouring effect normally produced by tidal and wind currents, and the formation of a submerged sandbar across the harbor mouth, with a consequent steady increase in the dissolved hydrogen sulfide content of the harbor water.

Plans for remedial measures to eliminate this major health hazard have been submitted to the Los Angeles City Council, and the Board of Harbor Commissioners, and are being put into effect as rapidly as possible at the insistence of Dr. Parrish, City Health Officer of Los Angeles. These measures include (1) removal by suction dredging of the layer of organic sludge or sediment, which is the source of continuous generation of hydrogen sulfide, from the bottom of the harbor; (2) increase in capacity of the present cannery waste sewage system, and construction of an adequate primary sewage treatment plant to remove solids from the cannery waste, permitting the discharge of an innocuous effluent into the ocean at a distance from the harbor entrance; (3) provisions for continuous circulation of fresh sea water through the harbor to prevent stagnation and settling of organic wastes to the harbor floor.

Officials of canneries at Fish Harbor are making every possible effort to cooperate with the city and state health departments in protecting the health of employees in their establishments. Several of these plants have already installed mechanical exhaust ventilating equipment, which greatly reduces the hydrogen sulfide hazard to workers by exhausting contaminated air from the workroom to the outside atmosphere, thereby drawing in large volumes of fresh air which dilutes the toxic gas escaping from flumes and tanks to a concentration below the danger threshold. Similar ventilating systems are being installed in other plants in the affected area.

### LEAD DUST IN POTTERY MANUFACTURING

At the request of the plant superintendent, a series of quantitative atmospheric lead dust determinations were made in the glaze mixing department of a pottery manufacturing establishment employing 208 persons. Measured volumes of air drawn from the breathing level of workers at the glaze batch mixer and frit furnace, where lead compounds in powdered form are added to the glaze mix, were passed through impinger tubes containing nitric acid solution. Laboratory analyses of these air samples revealed that employees at several working stations were exposed to concentrations of lead dust in excess of the maximum safe limit of 1.5 milligrams per 10 cubic meters of air.

Practical methods for the trapping of lead dust at its sources of escape, thereby preventing its dissemination into the workroom atmosphere, have been worked out with the plant management, and are now being installed. Upon their completion, further tests will be conducted to evaluate the efficiency of these control measures in eliminating the lead poisoning hazard in this establishment.

## MORBIDITY

Complete Reports for Following Diseases for Week Ending  
January 18, 1941

## Chickenpox

609 cases: Alameda County 1, Alameda 1, Berkeley 18, Oakland 25, San Leandro 1, Walnut Creek 2, Fresno County 2, Sanger 1, Eureka 1, Holtville 2, Calipatria 1, Kern County 12, Lemoore 2, Los Angeles County 47, Alhambra 3, Burbank 7, Compton 10, El Monte 2, El Segundo 9, Glendale 1, Huntington Park 1, Long Beach 3, Los Angeles 50, Monrovia 1, Pasadena 5, Pomona 3, San Fernando 4, San Marino 9, Santa Monica 7, South Pasadena 2, Whittier 1, South Gate 10, Maywood 1, Bell 1, Madera County 1, Mill Valley 5, Merced County 7, Gustine 3, Merced 2, Monterey County 6, King City 2, Orange County 2, Brea 2, Fullerton 6, Orange 3, Santa Ana 10, La Habra 5, Corona 4, Elsinore 3, Riverside 10, Sacramento 43, San Bernardino County 10, Ontario 1, San Diego County 6, National City 2, San Diego 26, San Francisco 73, San Joaquin County 17, Lodi 7, Stockton 7, Paso Robles 8, San Luis Obispo 1, San Mateo County 2, Daly City 4, San Mateo 1, Santa Barbara County 4, Lompoc 3, Santa Barbara 4, Santa Maria 2, Santa Clara County 5, Los Gatos 6, Palo Alto 12, San Jose 8, Sunnyvale 3, Santa Cruz 1, Watsonville 10, Siskiyou County 1, Vallejo 1, Red Bluff 2, Trinity County 2, Tulare County 1, Porterville 12, Woodland 3, Marysville 2.

## Diphtheria

21 cases: Oakland 1, Pittsburg 1, Fresno County 1, Fresno 1, Los Angeles County 1, Long Beach 1, Los Angeles 4, Merced County 1, Sacramento County 1, Sacramento 3, San Francisco 1, Stockton 1, Shasta County 3, Tulare County 1.

## German Measles

86 cases: Alameda County 20, Berkeley 1, Livermore 5, Oakland 3, Fresno County 1, Kern County 1, Lassen County 2, Susanville 14, Los Angeles County 3, Long Beach 16, Los Angeles 4, Monterey County 1, Orange County 2, Santa Ana 1, Riverside 1, Sacramento 1, Redlands 1, San Diego 6, San Francisco 1, San Jose 1, Santa Cruz County 1.

## Influenza

2384 cases: Alameda County 144, Albany 1, Berkeley 60, Emeryville 1, Hayward 1, Livermore 1, Oakland 15, Chico 2, Contra Costa County 9, Concord 1, Walnut Creek 1, Fresno County 3, Fresno 14, El Centro 1, Kern County 5, Bakersfield 9, Lassen County 5, Los Angeles County 908, Alhambra 16, Arcadia 1, Burbank 2, Culver City 1, Glendale 1, Glendora 1, Huntington Park 1, Inglewood 1, Long Beach 6, Los Angeles 186, Montebello 1, Pasadena 2, San Gabriel 456, Santa Monica 3, Whittier 2, South Gate 3, Monterey Park 58, Mill Valley 1, Ross 7, Yosemite National Park 1, Merced County 11, Merced 17, Monterey County 5, Pacific Grove 1, Napa County 2, Napa 4, Fullerton 1, Santa Ana 7, Laguna Beach 1, Tustin 1, Riverside 1, Sacramento 15, San Bernardino County 13, San Diego County 20, La Mesa 1, National City 1, San Diego 1, San Francisco 93, Redwood City 4, San Mateo 12, South San Francisco 2, Santa Maria 1, Santa Clara County 1, Palo Alto 4, San Jose 4, Shasta County 1, Sonoma County 5, Petaluma 7, Santa Rosa 1, Sutter County 1, Corning 14, Tulare County 31, Dinuba 19, Ventura County 10, Oxnard 3, Ventura 46.

## Malaria

One case: Santa Ana.

## Measles

106 cases: Livermore 2, Oakland 3, Fresno County 1, Kern County 14, Bakersfield 3, Susanville 9, Los Angeles County 3, Alhambra 1, Glendale 1, Los Angeles 9, Pasadena 1, San Gabriel 1, Ross 1, Monterey County 1, Carmel 1, Santa Ana 1, Sacramento 2, San Bernardino County 1, Redlands 1, San Diego County 1, Coronado 1, San Mateo 1, Santa Barbara County 9, Santa Barbara 3, San Jose 1, Santa Cruz 5, Siskiyou County 1, Solano County 1, Vacaville 11, Ventura 3.

## Mumps

306 cases: Alameda 1, Oakland 9, Alpine County 1, Martinez 1, Fresno 1, Kern County 9, Bakersfield 1, Delano 23, Los Angeles County 36, Claremont 1, El Segundo 1, Glendale 7, Huntington Park 1, Long Beach 27, Los Angeles 30, Pasadena 3, Pomona 5, Santa Monica 2, Whittier 1, Hawthorne 1, South Gate 1, Monterey Park 3, Bell 2, Sausalito 2, Grass Valley 16, Orange County 13, Brea 1, Huntington Beach 20, Orange 2, Santa Ana 2, La Habra 1, Blythe 1, Corona 3, San Jacinto 2, Ontario 1, San Diego 6, San Francisco 17, San Joaquin County 4, Lompoc 1, Santa Cruz County 3, Solano County 5, Tulare County 27, Dinuba 5, Ventura County 3, Fillmore 1, Oxnard 1, Ventura 2.

## Pneumonia (Lobar)

97 cases: Oakland 6, Concord 1, Martinez 1, Pittsburg 1, Walnut Creek 1, Fresno County 1, Kern County 4, Los Angeles County 10, El Segundo 1, Glendale 1, Long Beach 2, Los Angeles 35, Montebello 1, Pasadena 2, Pomona 2, Monterey Park 1, Monterey County 1, Monterey 1, Corona 1, Sacramento 1, Isleton 1, San Diego County 1, San Francisco 8, Paso Robles 1,

Santa Barbara County 1, Lompoc 1, Palo Alto 1, San Jose 1, Petaluma 1.

## Scarlet Fever

117 cases: Butte County 2, Martinez 1, Fresno County 2, Fresno 3, Sanger 3, Brawley 4, El Centro 2, Kern County 1, Susanville 2, Los Angeles County 8, Alhambra 1, Burbank 2, Huntington Park 3, Inglewood 1, Los Angeles 31, Manhattan 1, Pasadena 3, San Gabriel 1, South Gate 4, Maywood 2, Merced County 3, Orange County 1, Riverside County 2, Elsinore 2, Sacramento 4, Redlands 1, San Diego County 1, San Diego 4, San Francisco 7, San Joaquin County 2, Manteca 5, San Luis Obispo County 3, San Luis Obispo 1, Sutter County 2, Tulare County 2.

## Smallpox

No cases reported.

## Typhoid Fever

2 cases: Tehama County 1, California 1.\*

## Whooping Cough

462 cases: Alameda 7, Albany 4, Berkeley 20, Oakland 33, Martinez 1, Fresno County 4, Kern County 4, Corcoran 2, Los Angeles County 44, Arcadia 1, Burbank 1, Compton 2, Culver City 2, El Segundo 1, Glendale 7, Inglewood 4, Long Beach 25, Los Angeles 39, Manhattan 3, Pasadena 10, Redondo 7, San Fernando 4, Santa Monica 8, Hawthorne 3, South Gate 2, Monterey Park 1, Bell 2, Monterey County 14, Orange County 9, Huntington Beach 9, Orange 10, Santa Ana 14, Laguna Beach 1, Riverside County 2, Corona 3, Sacramento 6, San Diego County 8, San Diego 14, San Francisco 51, San Joaquin County 15, Stockton 9, San Luis Obispo County 5, San Luis Obispo 16, San Mateo County 3, Redwood City 1, Santa Barbara County 5, Santa Barbara 1, Santa Clara County 3, Santa Cruz 2, Vallejo 1, Santa Rosa 2, Sutter County 3, Tulare County 2, Ventura County 3, Fillmore 7, Ventura 2.

## Meningitis (Epidemic)

4 cases: Huntington Park 1, Pasadena 1, Stockton 1, Yuba County 1.

## Dysentery (Amoebic)

4 cases: Los Angeles 3, San Mateo 1.

## Dysentery (Bacillary)

11 cases: Oakland 1, Azusa 1, Los Angeles 6, San Francisco 1, San Jose 2.

## Ophthalmia Neonatorum

2 cases: Los Angeles.

## Poliomyelitis

One case: Los Angeles County.

## Trachoma

16 cases: Oakland 1, Kings County 3, Lake County 3, Madera County 6, Marin County 2, San Francisco 1.

## Encephalitis (Epidemic)

One case: Tulare County.

## Typhus Fever

One case: Los Angeles.

## Jaundice (Epidemic)

3 cases: Fresno County.

## Food Poisoning

One case: San Francisco.

## Undulant Fever

4 cases: Los Angeles County 1, Burbank 1, Glendale 1, Pomona 1.

## Epilepsy

27 cases: Los Angeles County 1, Los Angeles 18, Pasadena 1, San Francisco 4, San Joaquin County 1, Stockton 1, Santa Clara County 1.

## Rabies (Animal)

6 cases: Long Beach 1, Los Angeles 3, Riverside 2.

\* Cases charged to "California" represent patients ill before entering the State or those who contracted their illness traveling about the State throughout the incubation period of the disease. These cases are not chargeable to any one locality.

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